



## PATENT COOPERATION TREATY

PCT

EC'D 03 JAN 2005

INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PSIC071WO		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/09848	International filing date (day/month/year) 05.09.2003	Priority date (day/month/year) 24.09.2002	
International Patent Classification (IPC) or both national classification and IPC C09D11/00			
Applicant SICPA HOLDING S.A.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand  05.04.2004		Date of completion of this report  30.12.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Girard, Y  Telephone No. +31 70 340-2558 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/EP 03/09848

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-31 as originally filed

**Claims, Numbers**

1-25 received on 16.07.2004 with letter of 16.07.2004

**Drawings, Sheets**

1-6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY  
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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-25
	No: Claims	
Inventive step (IS)	Yes: Claims	1-25
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-25
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

D1: US 6 303 213 A

D2: WO 00 77104 A

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and shows (the references in parentheses applying to this document): printing inks comprising at least one emitting colorant and at least one reflecting colorant, these colorants having similar or identical hues and being such that their color locus is very close to one of the standard color in the CIELAB system.

The subject-matter of claim 1 differs from this known prior art in that it relates to printing inks comprising at least three colorants, one of which having an absorption maximum in the visible range substantially different from the absorption maxima of the base colors of the CIEXYZ system, and another one having an absorption maximum in the UV or in the IR range.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a better protection for a security article against counterfeiting which allows an easy authentication by electronic machines.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: In D1 the skilled person could find no incentive to the use of the combination of colorants as set out in claim 1. The teaching of D2, which solves the same problem by a completely different solution: use of colorants whose spectral response deviates from a predicted linear additive spectral response, gave no indication either pointing to that direction.

Claims 2-5 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Same applies to independent claim 6, which relates to a set of printing inks according to claims 1-5, to independent claim 11 which deals with a method of marking an article by

applying to it a printing ink according to claims 1-5, to independent claim 13 which deals with a method of authenticating an article marked by the method of claim 11, to independent claim 20 which relates to the marking produced, to independent claim 21 which deals with the marked article, and to "use claims" 22-25 which claim the use of the colorants combination or the printing inks as set out in claim 1, of the set of printing inks according to claim 6 or of the marking of claim 20 for marking and/or authenticating an article.

All the claims depending on the cited independent claims meet also as such the requirements of Articles 33(2) and (3) PCT.

**Re Item VIII:**

1. The Applicant should well be aware that expressions like "preferably" or "most/more preferably" have no limiting effect on the scope of a claim, i.e. features following such expressions are regarded as merely optional (cf. PCT Guidelines, C-III, 4.6).
2. Claims 5 and 10 appear to have no support in the description.  
Claim 16 is incompletely supported by the description as the feature "hand-held authentication device" is not mentioned.

Amended Claims:

1. Printing ink, comprising
  - a) at least one dye or pigment having at least one absorption maximum in the visible range of the electromagnetic spectrum which is substantially different from the absorption maxima of the base colors of the CIEXYZ system, and
  - b) at least one other dye or pigment having an absorption band in the visible range of the electromagnetic spectrum whose band width at half intensity is narrower than 2400  $\text{cm}^{-1}$ , preferably narrower than 2000  $\text{cm}^{-1}$ , and most preferably narrower than 1500  $\text{cm}^{-1}$ , and
  - c) at least one other dye or pigment having at least one absorption maximum in the ultraviolet or in the infrared region, preferably in the near-infrared region of the electromagnetic spectrum.
2. Printing ink according to claim 1, comprising at least three, preferably at least four different dyes or pigments having absorption spectra which are substantially different from each other.
3. Printing ink according to any one of claims 1 or 2, comprising at least two, preferably at least three different dyes or pigments having at least one absorption maximum in the infrared range, preferably the near-infrared range of the electromagnetic spectrum.
4. Printing ink according to any one of claims 1 to 3, comprising at least four different dyes or pigments having at least one absorption maximum in the visible range of the electromagnetic spectrum.

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5. Printing ink according to any one of claims 1 to 4, further comprising a reflecting pigment.
6. Set of printing inks, comprising at least two printing inks according to any one of claims 1 to 5.
7. Set of printing inks according to claim 6, comprising at least three, preferably at least four different printing inks according to any one of claims 1 to 5 each having a dye or pigment which is different from the dyes or pigments in the other printing inks.
8. Set of printing inks according to claim 7, wherein the different dyes or pigments have at least one absorption maximum in the visible range of the electromagnetic spectrum.
9. Set of printing inks according to any one of claims 6 to 8, wherein at least one printing ink, preferably at least two and more preferably at least three printing inks comprise a dye or pigment having at least one absorption maximum in the ultraviolet or in the infrared region, preferably in the near-infrared region of the electromagnetic spectrum.
10. Set of printing inks according to any one of claims 6 to 9, wherein at least one printing ink comprises a reflecting pigment.
11. Method for marking an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good, comprising the step of providing on said article a marking which is applied by using at least one

printing ink according to any one of claims 1 to 5 or a set of printing inks according to any one of claims 6 to 10 or by using at least one coating composition comprising at least one printing ink according to any one of claims 1 to 5 or a set of printing inks according to any one of claims 6 to 10.

12. Method according to claim 11, wherein said at least one coating composition is selected from the group consisting of pasty inks comprising intaglio inks, letterpress inks, and offset inks, from the group consisting of liquid inks comprising screen printing inks, helio-flexo inks, and gravure inks, from the group consisting of toners for electrostatic or electrophoretic printing, or from the group consisting of ink-jet inks comprising drop-on-demand ink-jet inks and continuous ink-jet inks.
13. Method of authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good, comprising the steps of:
  - a) measuring an absorbance, reflectance or transmittance spectrum of an article marked by the method according to any one of claims 11 or 12, in the UV and/or visible and/or IR wavelength domain of the electromagnetic spectrum;
  - b) comparing the spectrum measured under a) and/or information derived therefrom with a corresponding spectrum of an authentic item and/or information derived therefrom.
14. Method according to claim 13, wherein said method is carried out by a machine, such as a currency acceptor, a ticket validator, or a hand-held authentication device.



15. Method according to claim 13 or 14, wherein in step a) said spectrum is measured as a vector of digital values representing the absorption and/or reflection and/or transmission of said marking at a selected number of wavelengths or over a selected number of wavelength domains.
16. Method according to claim 13 or 14, wherein step b) is carried out by deriving the statistically independent hyper-color coordinates of said marking from the vector of digital values measured in step a), and comparing at least one of said hyper-color coordinates with a corresponding reference value of an authentic item, and deriving an authenticity indicator from the comparison result using a pre-established decision criterion.
17. Method for authenticating an article according to one of claims 13 to 16, wherein said spectrum is measured using a combination of a broad-band emitting light source and a plurality of narrow-band sensitive photodetectors, or using a combination of a broad-band sensitive photodetector and a plurality of narrow-band emitting light sources, or using a combination of a broad-band emitting light source and a diffractive or dispersive spectrometer device.
18. Method for authenticating an article according to one of claims 13 to 16, wherein said spectrum is measured using a combination of a plurality of narrow-band emitting light sources, such as LEDs, and a broad-band sensitive imaging device, such as a CCD- or CMOS- camera, yielding spectral or hyperspectral imaging information.

19. Method for authenticating an article according to one of the claims 13 to 18, wherein said statistically independent hyper-color coordinates are derived from the measured spectrum by the means of a mathematical Least-Squares algorithm.
20. Marking, comprising at least one printing ink according to any one of claims 1 to 5 and/or at least one set of printing inks according to any one of claims 6 to 10.
21. Article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good, comprising at least one marking according to claim 20.
22. Use of a combination of
- a) at least one dye or pigment having at least one absorption maximum in the visible range of the electromagnetic spectrum which is substantially different from the absorption maxima of the base colors of the CIEXYZ system, and
  - b) at least one other dye or pigment having an absorption band in the visible range of the electromagnetic spectrum whose band width at half intensity is narrower than  $2400 \text{ cm}^{-1}$ , preferably narrower than  $2000 \text{ cm}^{-1}$ , and most preferably narrower than  $1500 \text{ cm}^{-1}$ , and
  - c) at least one other dye or pigment having at least one absorption maximum in the ultraviolet or in the infrared region, preferably in the near-infrared region of the electromagnetic spectrum,
- for marking and/or authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.

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23. Use of a printing ink according to any one of claims 1 to 5 for marking and/or authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.
24. Use of a set of printing inks according to any one of claims 6 to 10 for marking and/or authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.
25. Use of a marking according to claim 20 for authenticating an article, such as a banknote, a document, a ticket, a foil, a thread, a label, a card, or a commercial good.